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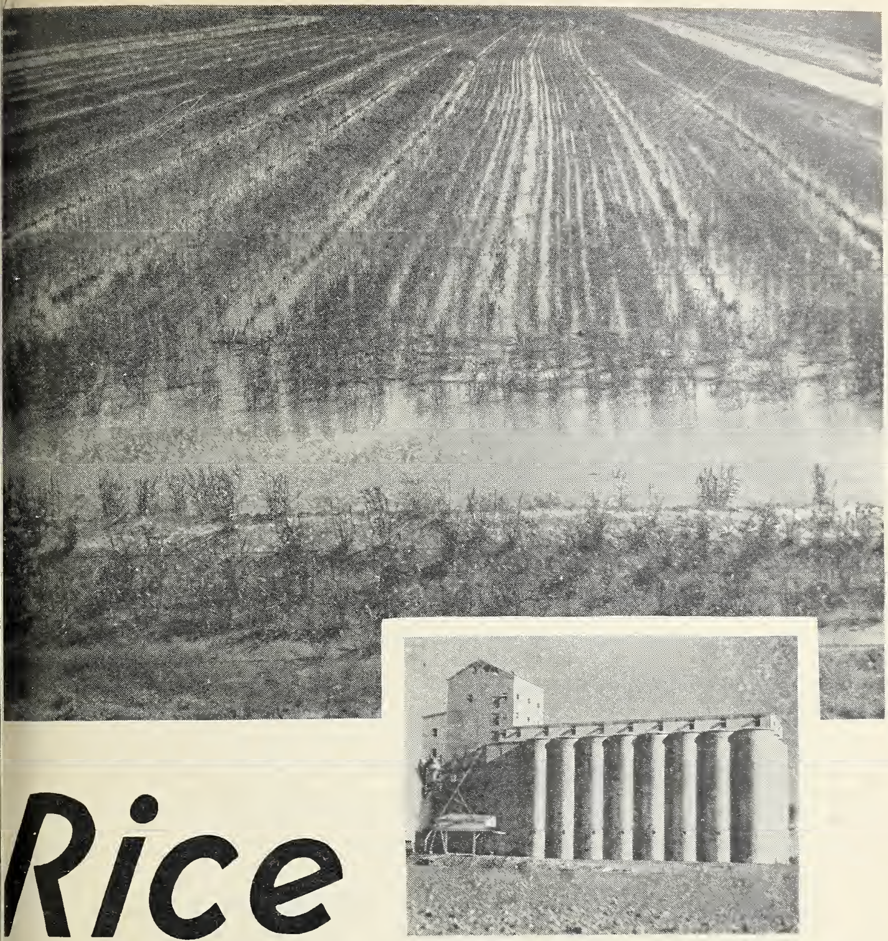

Rice

roduction and Marketing in the United States

Miscellaneous Publication No. 615

NITED STATES DEPARTMENT OF AGRICULTURE
RODUCTION AND MARKETING ADMINISTRATION

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RICE PRODUCTION AND MARKETING IN THE UNITED STATES

by G. A. COLLIER, Chief, Market News and Services Division, Grain Branch, Production and Marketing Administration

History of Early Rice Culture in the United States

It is not definitely known how or when rice was first introduced into the area now comprising the United States. The Virginia colonists experimented with rice culture.[1] Governor Berkeley of that colony carried or experiments in rice production in 1647 and in the last decade of that century Governor Andros promoted rice culture with some temporary success. None of these attempts, however, resulted in the establishment of a rice industry of any consequence.

Rice was first produced commercially in this country in South Carolina but accounts differ as to how the first seed rice was obtained. Although rice undoubtedly was cultivated in South Carolina prior to 1685, various accounts point to that year as significant because varieties of superior quality apparently were introduced into the colony in that year.

Having begun near Charleston the rice industry expanded into the southeastern part of South Carolina, also northward into northeastern South Carolina and along the lower Cape Fear River in North Carolina. Later rice production extended southward into Georgia and Florida but did not become an important industry in the latter State. Production expanded rapidly in these colonies until the outbreak of the Revolutionary War when annual exports approached 165,000 barrels of more than 400 pounds each.

How Early Colonists Planted and Cultivated Rice

Early colonists first planted rice [2] in the uplands and this practice continued for many years, according to early colonial writers. It is probable, however, that the colonists soon recognized the advantage of selecting moist lowlands for rice fields but the irrigation of rice was not begun until about 1724. These early areas were irrigated by water from springs or from ponds formed by the construction of dams. After its use for irrigating the rice fields the water was drained off through ditches into the streams. The industry continued mainly in the inland lowlands throughout the period preceding the Revolutionary War.

Immediately following the colonial period, rice growing in the Southeastern States shifted from inland lowlands to tidal lands which were peculiarly adapted to rice culture because the rise and fall of the tide permitted control of flooding and draining the rice fields. Also, rice could be produced more economically on the tidal lands than in the inland lowlands because less labor was required. The growing period was shortened and higher yields per acre were obtained.

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[1] Gray, L. C. HISTORY OF AGRICULTURE IN THE SOUTHERN UNITED STATES TO 1860. Vol. I, p. 277. Carnegie Institution of Washington. Washington, D. C. 1933.

[2] Gray, L. C. HISTORY OF AGRICULTURE IN THE SOUTHERN UNITED STATES TO 1860. Vol. II, pp. 721–731. Carnegie Institution of Washington. Washington, D. C. 1933.

The tidal-land area, although well suited to rice growing, was limited to areas along certain rivers from North Carolina to Jacksonville, Fla. There was, therefore, no great expansion of the rice area in the United States from the close of the colonial period to the outbreak of the Civil War. During this period South Carolina was the most important rice-growing State. Georgia was second, and North Carolina was third. The expansion of rice production in the colonial period was also impeded by the laborious methods used in growing, harvesting, and milling.

Harvesting and Milling in the Colonial Period

Most growers in the colonial period cut their rice with a sickle but a few used a cradle. The rice was bound in bundles, carried to the barnyard, and stacked until the threshing season. Threshing was done generally with a flail until about 1800 when threshing machines were introduced. As these machines were improved and made efficient, they gradually came into general use.

Rice-milling machinery also was very crude. It was still customary at the beginning of the nineteenth century to remove the husks and polish the grain with mortar and pestle and to blow off the chaff with hand fans. A Mr. Lucas applied water power to rice mills in 1787 and his son Jonathan Lucas built the first tide mill in 1791–92. All the rice-milling operations were combined within a mill between 1790 and 1800. A patent rice mill which substituted millstones for the crude method of pounding was invented in 1832. By 1855 there were a number of rice mills in the neighborhood of Charleston, S. C., and Savannah, Ga. These apparently milled rice only for domestic use, since exports were mostly in the form of rough, or paddy, rice.

Rice Production Shifts to Western States

The Civil War adversely affected the production of rice in the South Atlantic States. During the war most of the ricelands were uncultivated and after the war a shortage of funds made it difficult to replace many of the facilities that had been destroyed. Also, the high labor cost made the crop less profitable. Acreage decreased rapidly, and by 1890 rice production in this area had become of little commercial importance. As rice acreage decreased in the South Atlantic States it increased along the lower Mississippi River in Louisiana [3] where production was begun as early as 1718. By 1889 Louisiana had become the leading State in rice production. Table 1 shows how rice production shifted from North Carolina, South Carolina, and Georgia to Louisiana, Texas, and Arkansas.

By 1939 rice production in the United States had increased to 54 million bushels, of which 45 million were produced in the three Southern States and 9 million in California. Stimulated by war needs, rice production increased sharply during the 5 years, 1940 to 1944. The 1945 crop reached a record of over 70 million bushels, of which about 15 million were grown in California.

Early rice production in Louisiana was along the lower stretches of the Mississippi River. At that time the crop was grown entirely for home

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[3] Jones, Jenkin W., Jenkins, J. Mitchell, Wyche, R. H., and Nelson, Martin. RICE CULTURE IN THE SOUTHERN STATES. U. S. Dept. Agr. Farmers' Bul. 1808, 29 pp. 1938.

TABLE 1.—*Rice: Production in the United States, 1839–1945*

State	1839	1849	1859	1869	1879	1889	1899	1909	1919	1929	1939	1945
	1,000 bu.	*1,000 bu.*	*1,000 bu.*	*1,000 bu.*	*1,000 bu.*	*1,000 bu.*	*1,000 bu.*	*1,000 bu.*	*1,000 bu.*	*1,000 bu.*	*1,000 bu.*	*1,000 bu.*
Arkansas	....	2	1	3	....	....	....	1, 264	7, 600	7, 956	8, 550	14, 612
California	....	....	....	....	....	....	....	....	9, 300	5, 719	9, 000	14, 520
Florida	17	39	8	14	47	36	81	20	33	....	....	....
Georgia	445	1, 401	1, 889	801	913	524	402	139	58	....	....	....
Louisiana	130	159	228	570	834	2, 721	6, 213	12, 617	19, 005	18, 832	21, 340	23, 028
Mississippi	28	98	29	13	62	24	27	....	....	....	....	....
North Carolina	101	197	273	74	202	210	284	22	....	....	....	....
South Carolina	2, 180	5, 753	4, 284	1, 162	1, 873	1, 091	1, 704	528	131	....	....	....
Texas	....	3	1	2	2	4	259	8, 996	6, 784	7, 027	15, 172	18, 000
All others	7	93	20	10	29	16	33	....	....	....	....	....
U. S. total	2, 908	7, 745	6, 733	2, 649	3, 962	4, 626	9. 003	23, 586	42, 911	39, 534	54, 062	70, 160

Bureau of the Census. Statistics for 1945 are estimates of the Bureau of Agricultural Economics, U. S. Departmenr of Agriculture use, as commercial production was not begun until about 1865. In the Mississippi section[4] fields were flooded before any work was done and they were plowed while still under water. The seed was sown by hand and harrowed into the wet ground. The water was then drained off until the seed had germinated. When the new rice seedlings were a few inches high the water was again turned on and the fields were kept well covered until near harvest time. The crop generally matured in August and was cut with a sickle and bound in bundles. The bundles were gathered into shocks and allowed to dry for about a week, after which the rice was threshed. These methods were similar to those used in the South Atlantic States.

From its beginning in the Delta country, rice culture in Louisiana extended northward along the Mississippi River and westward along the Coastal Plain. Here a new method of growing rice was developed which differed materially from that used in all other rice-producing countries. About 1885 a few farmers from the central-western Prairie States settled on the great southern prairie which extends about 100 miles along the gulf coast in southwestern Louisiana. Finding that rice, which had been grown there by primitive methods for many years for home use, was well suited to local agricultural conditions they began immediately to expand its production, by using the machinery that had been brought with them from the wheat country. This equipment included farm tools such as the gang plow, disk harrow, broadcasting seeder, and the grain binder. Although many difficulties were encountered in adapting prairie wheat-growing practices to rice culture, the efforts of these farmers were finally successful and soon made Louisiana the largest rice-growing State.

Soil and climate in southeastern Texas are almost the same as those in southwestern Louisiana. Rice growing, therefore, soon moved westward into that territory. The area now extended about 200 miles southwestward along the Gulf coast on a belt ranging from 25 to 75 miles wide. Beaumont, Houston, El Campo, Orange, Galveston, and Bay City became important milling centers.

A prairie area, about 50 miles wide and nearly 200 miles long, suitable for rice culture is located in eastern Arkansas. Rice growing was begun in this area as early as 1897 but did not become established until about 1903. By 1908 production had increased to such an extent that a rice mill was needed. Local capital was subscribed and the Stuttgart Rice Mill was erected and placed in operation. In 1944 the Arkansas rice area extended from Clay County on the north to Drew County on the south and from Lonoke County on the west to St. Francis County on the east. The number of rice mills had grown to 13 and Stuttgart, DeWitt, Jonesboro,and Carlisle had become the principal milling centers.

In California, where rice is now an important crop, production was attempted as early as 1860 but did not become important until about 1912, when about 1,400 acres in the Sacramento Valley were seeded. From this small start the area expanded to 162,000 acres in 1920 and then dropped to 90,000 in 1924. In 1943, stimulated by the war effort to supply food to the United States allies and liberated areas, the California rice area was extended to 230,000 acres. The chief producing areas are located in the Sacramento and San Joaquin Valleys. In recent years small commercial crops also have been grown in the Imperial Valley.

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[4] Knapp, S. A. THE PRESENT STATUS OF RICE CULTURE IN THE UNITED STATES. U. S. Dept. Agr. Bot. Bul. 22, 56 pp. 1899.

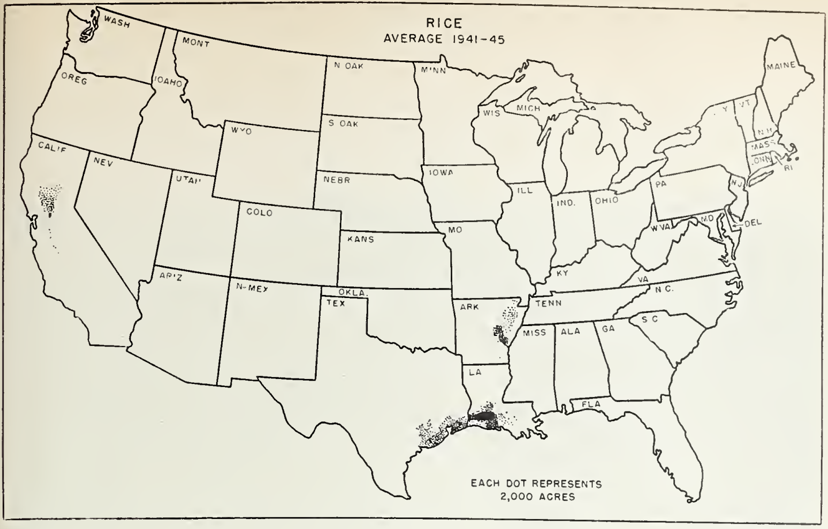

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FIGURE 1.—Areas of rice production in the United States, 1941–45.

Climatic and Soil Requirements

Successful rice culture is dependent upon high temperatures during the growing season, a dependable fresh water supply for the irrigation period, soils that are comparatively level and underlain with impervious subsoil, and good drainage. Areas which meet these requirements include the broad level prairie region of southwestern Louisiana and southeastern Texas, the prairie region of eastern Arkansas and the interior valleys of California. Production in the United States is now mainly in these three regions (fig. 1).

Preparation of Land

In the United States rice is grown in about the same way as other grain crops, such as wheat, oats, and barley, except that rice is irrigated and the land is kept under water 4 to 8 inches from the time the plants are from 6 to 10 inches high until the heads are nearly ripe and the crop is ready to drain for harvesting. About the same kinds of farm machinery are used to sow and harvest rice as are used for other cereal grains.

The first thing that must be done in preparing land for rice growing is to throw up levees to hold irrigation water at a uniform depth over the field (fig. 2). Irrigation ditches and canals carry the water to the fields from the wells and other sources of water. Ditches to drain off the water in preparation for the harvest must also be provided. Civil engineers are usually employed to do this work or to lay out the basic plan for it.

The land is prepared for seeding by plowing, harrowing, and dragging. Farmers in Louisiana and Texas plow their riceland in the fall and then cultivate and pulverize it in the spring with a disk or other harrow, and other equipment. Farmers in Arkansas and California generally both plow and harrow the ground in the spring just before seeding time. In the Southern States the seeding is usually done with a grain drill or broadcast seeder (fig. 3). In California the greater portion of the acreage is seeded on water by airplane.

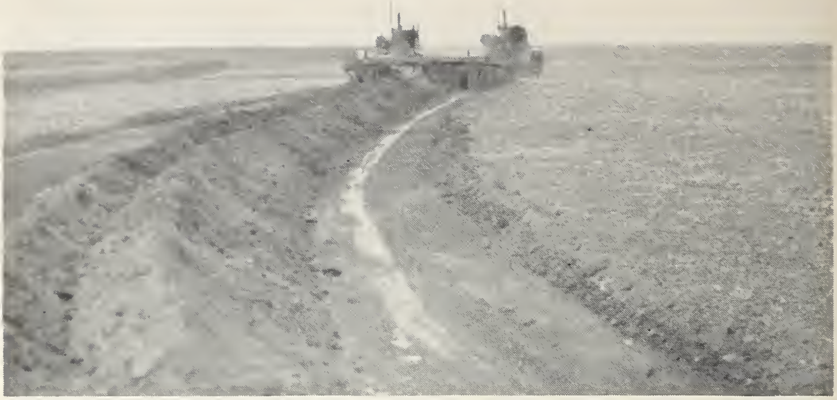

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FIGURE 2.—Earthen levees are thrown up around the rice fields to hold the irrigation water at the desired depth.

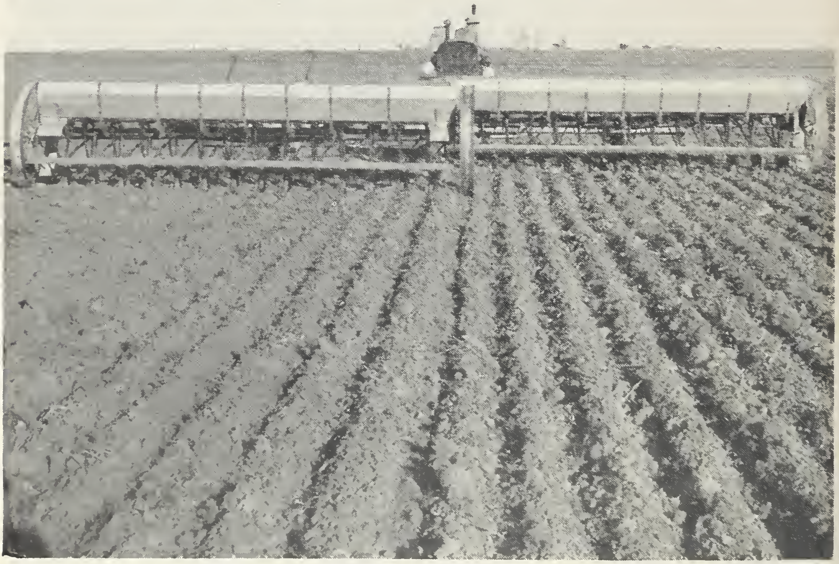

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FIGURE 3.—Drills such as are used in seeding wheat are used for seeding rice.

Seeding Time

The time of seeding rice is from March to May in the Southern States. When drilled the seed is placed in the soil at a uniform depth of 1 to 2 inches. From 90 to 100 pounds of clean seed is required to sow 1 acre. If the seed is broadcast, 125 to 150 pounds per acre is required and it is usually covered by harrowing or disking the field after the seed has been sown. Under favorable moisture and weather conditions the seed germinates in 10 to 14 days. When the young plants reach a height of 6 to 8 inches the first irrigation water is applied and the land is submerged to a depth of 1 to 2 inches. The depth is gradually increased to 4 to 8 inches as the plants grow taller.

In the early days of rice production in California the seed was sown with grain drills and endgate broadcast seeders, the latter method predominating. About 1930, however, seeding on the water by airplane was begun in order to control weeds. This method was found to give satisfactory results and was much faster than any other method. Airplane seeding, therefore, increased rapidly, and in 1945 about 90 percent of the acreage was sown from the air (fig. 4). Seeding rice from an airplane is a relatively simple operation. A hopper that will hold about 600 pounds of seed rice or enough to sow 5 to 6 acres is built in the plane in front of and below the pilot's seat. The bottom of the hopper slants downward to an adjustable opening which runs the full width of the hopper. Through the opening the seed rice runs out onto a sloping baffleboard where it is caught by the draft from the airplane propeller and scattered over the field. The seed is sown quite evenly over a strip 30 to 50 feet wide for each trip of the plane across the field. To obtain uniform coverage and to prevent overlapping of the seeded area or missing some of the land, the pilot of the plane is guided by a flagman at each end of the field and by one in the middle if the field is large. About 400 acres per day can be seeded by this method compared with 25 to 40 acres by endgate seeder or drills pulled by a tractor.

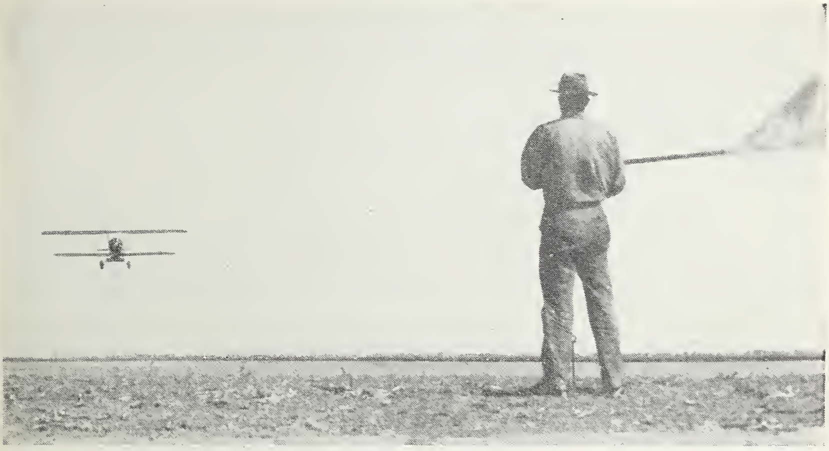

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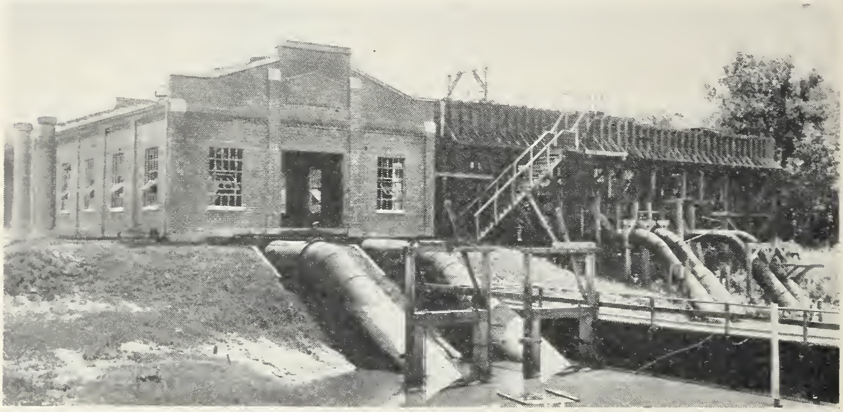
FIGURE 4.—Rice seeding by airplane is the modern way in California.

Irrigation of Rice

From 48 to 60 inches of water are normally required to produce a rice crop in Louisiana and Texas. Of this amount one-fourth to one-half may be supplied by rainfall during the growing season. The remainder must be supplied from wells or streams. Along the Gulf Coast the water is obtained mostly from the sluggish streams that flow through the prairies to the Gulf of Mexico. The water is pumped from these streams and is distributed to the rice fields through canals which are usually maintained and owned by private companies that sell the water to the growers (fig. 5). The cost varies from year to year but usually ranges from $8 to $10 per acre each season.

In Arkansas most of the irrigation water is obtained from wells (fig. 6). The size of the pumps that must be used depends on the depth of the well and the number of acres to be watered. The wells are from 25 to 60 feet deep and the pumps generally are large enough to supply 5 or 6 gallons of water per minute per acre. To produce a rice crop on normal soil in Arkansas requires 18 to 24 inches of pumped water in addition to 6 inches of seasonal rainfall. The cost of pumping the water usually ranges from $8 to $10 per acre or about the same as the cost in Louisiana and Texas where the water is obtained mostly from the streams.



PISAE 6136

FIGURE 5.—Modern irrigation pumping stations supply water for large areas.

The water flows by gravity through canals from the large pumping plants to the rice fields. There it is distributed to the crops through shallow irrigation ditches which run along the higher side of the field. Water is applied through control gates at a rate that will maintain the desired depth and replace water loss by evaporation, seepage, and that used by the rice plants. In times of drought, wells sometimes fail to supply all the water that is needed. As a result the crop is damaged and does not produce a good yield. On the Coastal Plain, dry weather occasionally lowers the streams so much that salt water flows in from the gulf. If a large quantity of this salt water is pumped into canals and allowed to flow over the rice field it may seriously damage the crop. In most seasons, however, rainfall in the Louisiana and Texas rice area is sufficient to keep the streams supplied with fresh water.

In California, water for irrigating rice is obtained mostly from rivers and streams. The system of canals and irrigation ditches is similar to that in the southern belt, but the time and method of irrigating the rice differ somewhat from those in the South. In California it is necessary to apply water to germinate the seed because of the dry soil and weather.

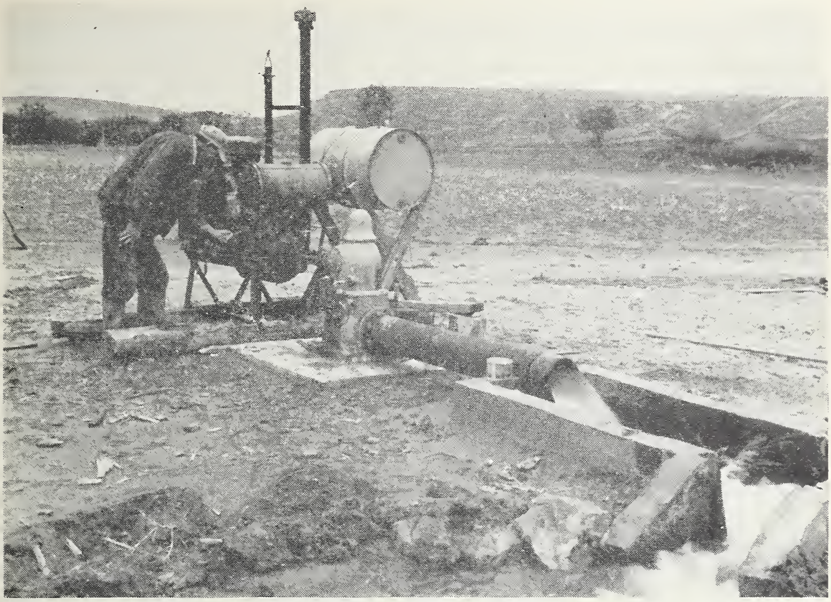


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FIGURE 6.—Some rice farmers have individual irrigation pumping installations.

Seed beds are prepared and the land is submerged to a depth of from 4 to 6 inches. Seed that has been soaked is then sown by airplane on the water. After the seed falls on the water it settles immediately onto the soft soil below and germinates quickly. The water controls weeds and also prevents birds from eating the seed before it has time to sprout and become established, which normally requires about 5 to 10 days. The water is held at a constant depth of 4 to 8 inches until the land is drained for harvest.

Varieties or Kinds of Rice

Different kinds of rice sold in grocery stores look very much alike to most people and comparatively few ask for rice by type or variety. There are, however, a number of varieties of rice that are marketed commercially which have distinctive appearance and taste.

The rice crop that the farmer grows is commonly called rough rice after it is threshed. The grain has a rough hull and looks a little like oats and barley.

Three general types of rice, based principally on the length of the grain, are grown in the United States. These are designated as short-, medium-, and long-grain types (fig. 7). The short-grain varieties are grown principally in California and to a lesser extent in the southern belt. They include such varieties as Caloro, Colusa, and Onsen.

Medium-grain rices include the Early Prolific, Zenith, Calady 40, and Blue Rose varieties. These, with the exception of Calady 40, are grown principally in the Southern States.

The long-grain varieties include Rexoro, Nira, Texas Patna, Bluebonnet, and Fortuna. These are grown almost entirely in the southern rice belt.

Blue Rose, a medium-grain rice, was the leading variety for many years but the short-grain and some of the long-grain rices are increasing in importance. Of the 1945 crop about 20 percent was Rexoro, 18.4 percent Blue Rose, and 18.2 percent was short-grain rices, according to statistics compiled by The Rice Millers' Association. Next in order of importance came Zenith, comprising about 15 percent of the crop, and Early Prolific, 11.5 percent. All the other varieties together comprised about 17 percent of the commercial crop.

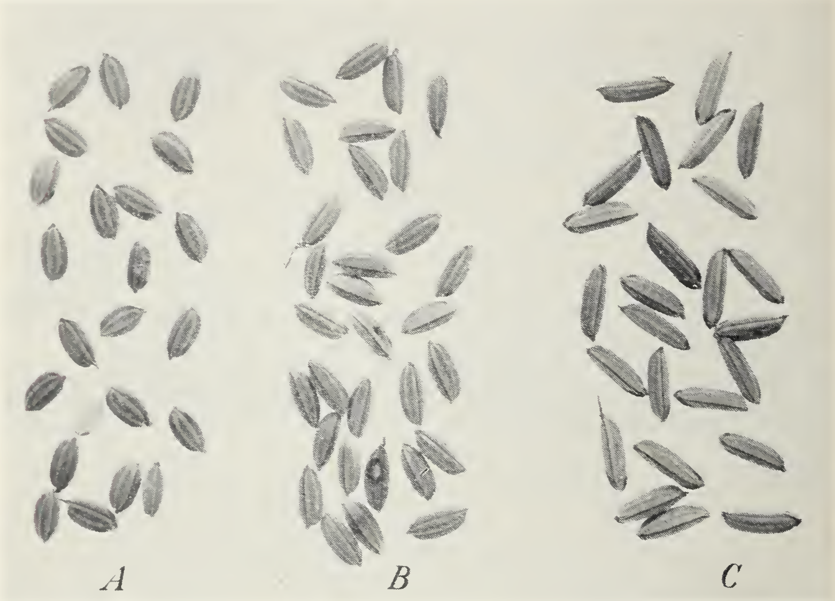

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FIGURE 7.—There are three types of rough rice: (*A*) short-grain, (*B*) medium-grain, and (*C*) long-grain.

Rice sold for table use normally consists of head rice or whole kernels. The quantity of head rice that can be obtained from a given quantity of rough rice is, therefore, important. In general, the average yield of head, or unbroken, rice is greatest for the short- and medium-grain varieties. In the Southern States the short-grain varieties usually give a milling outturn of 92 to 97 pounds of head rice from a barrel containing 162 pounds of rough rice. The medium-grain varieties yield from 85 to 92 pounds, and the long-grain varieties from 76 to 84 pounds per barrel. The average total yield of milled rice, which includes both the unbroken and broken rices, is also slightly higher for the short-grain than for the medium- and long-grain varieties. The long-grain varieties as a group have the lowest average total yield of milled rice.

Rice Harvesting and Threshing in Modern Times

Rice, when growing, looks very much like wheat, oats, or barley (fig. 8). The land on which it is grown, however, is kept covered with water either continuously or from the time that the seedlings are 4 to 6 inches high until the plants begin to ripen prior to full maturity. About 2 weeks before harvest, or when the rice is fully headed and the heads are turned down, the irrigation water is drained off the land. While the crop finishes ripening, the land dries so that harvesting machinery can be used in the field.

Rice is ready to cut when the grain in the upper portion of the heads is fully matured and that in the lower portion is in the hard-dough stage, or when the average moisture content of the rice grain is about 25 percent. Harvesting usually starts in Louisiana and Texas about August 1, in Arkansas about September 1, and in California around October 1. The harvesting period usually extends over a month or two, depending upon the varieties of rice grown. Sometimes harvesting of the late varieties in the southern belt is not completed until December.

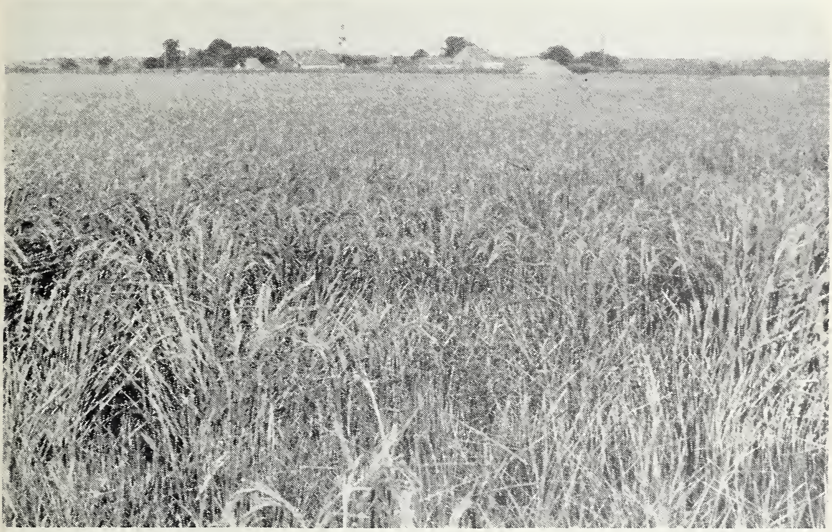

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FIGURE 8.—Field of growing rice.

Most of the rice in the Southern States and in California is either harvested with grain binders or combines (fig. 9). However, along the Mississippi River and in the Bayou Teche, or Evangeline country, of Louisiana, some rice is still cut with hand sickles, bound into sheaves, and placed in small shocks from which it is threshed as soon as it is sufficiently dry (fig. 10).

Rice cut with a binder is automatically tied into bundles. These are placed in shocks to dry before threshing. Usually 9 to 12 bundles are placed in each shock. Two bundles are placed on top of the others to serve as a cap. If the weather is fair, the grain will be dry enough to thresh and store in about 10 days or 2 weeks.

The combine cuts and threshes the rice in one operation (fig. 11). Combined rice is usually high in moisture and must be passed through a drier immediately to remove the excess moisture, otherwise it will heat and spoil.

Rice cut with a binder is threshed from the shock like wheat and other small grains (fig. 12). The sheaves or bundles are hauled to the thresher

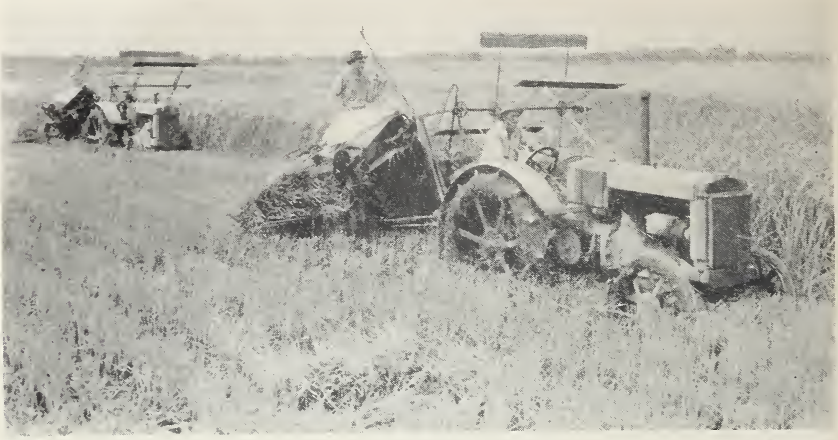

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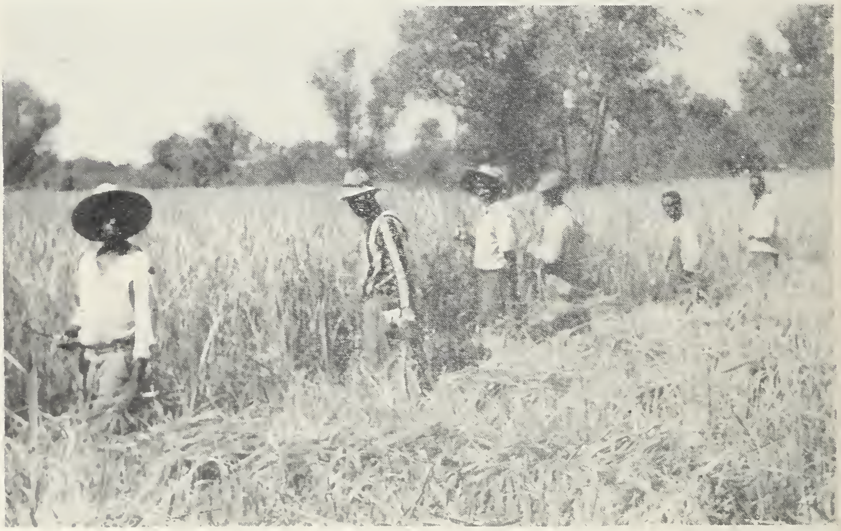
FIGURE 9.—Cutting rice with a binder in a southern rice field.



PISAE 6146

FIGURE 10.—In a few sections of Louisiana, rice is still cut with hand sickles.

in trucks or wagons. The essential parts of a thresher are a revolving cylinder and a concave with heavy metal teeth which thresh or strip the grain from the straw, shaker screens which separate the rice grain from the straw, and fans which blow out the chaff and dirt. The rough rice is carried to a bagging device or into a wagon box or truck and is hauled from the field to a warehouse or mill.

Rice that is harvested with a combine is threshed as it is cut. The threshing part of the combine is similar to that of a stationary thresher. It is built onto, and is part of, the machine that cuts the rice. As the rice is cut it falls onto a conveyor belt which carries it directly to the threshing part of the machine. The combine-drier method of harvesting is suited to all areas where rice is grown.

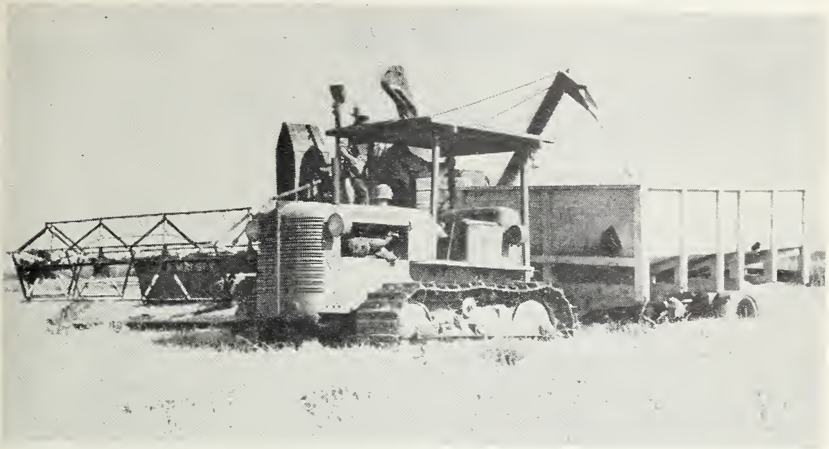

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FIGURE 11.—Combines cut and thresh the rice in one operation.

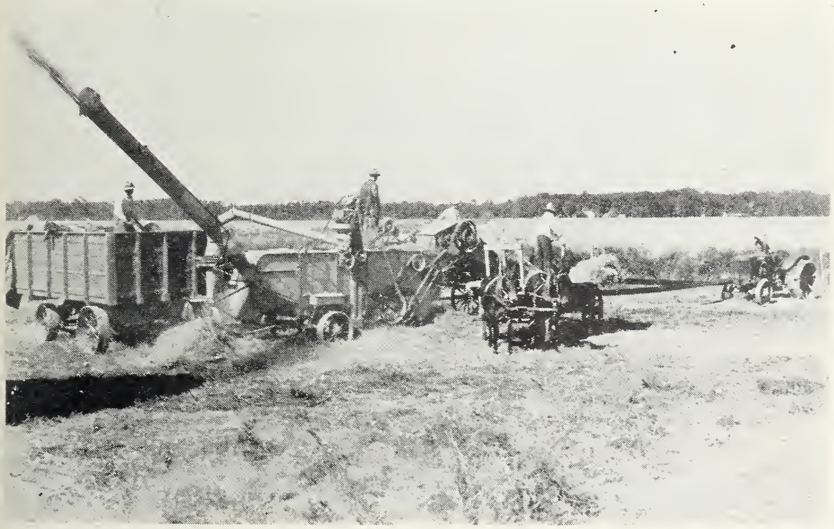
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FIGURE 12.—Threshing rice from fields in which the grain was cut with a binder.

The power required to operate a stationary threshing machine is generally supplied by tractors. Several years ago portable steam engines were generally used to furnish the power but these have been mostly displaced by tractors with gasoline or Diesel engines. Combines are either self-propelled or are pulled through the fields by tractors. When drawn by a tractor the power for running the cutting and threshing units is supplied by a gasoline or a Diesel engine mounted on the frame of the combine. A self-propelled combine is also powered by a gasoline or a Diesel engine which supplies power both for propelling the machine and operating the threshing unit. Some combines are equipped with dual engines, one for propelling the combine and one for operating the cutting and threshing mechanism.

Moving Rice to Market

Rough rice is delivered to mills, warehouses, or shipping points, mostly by growers, but commercial truckers in some areas do a considerable part of this work. In earlier years practically all the hauling was done by horse and wagon. More recently trucks have been used almost exclusively except by growers who produce relatively small crops and who do not have trucks and other mechanized equipment.

The quantity that may be hauled in one load depends upon the kind of equipment and the condition of the road. With a wagon and two horses a grower can haul about 20 bags or barrels averaging 162 pounds each (fig. 13).

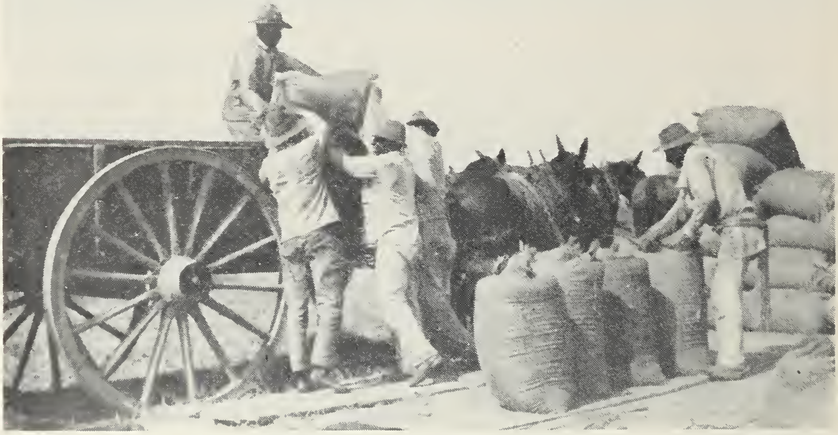

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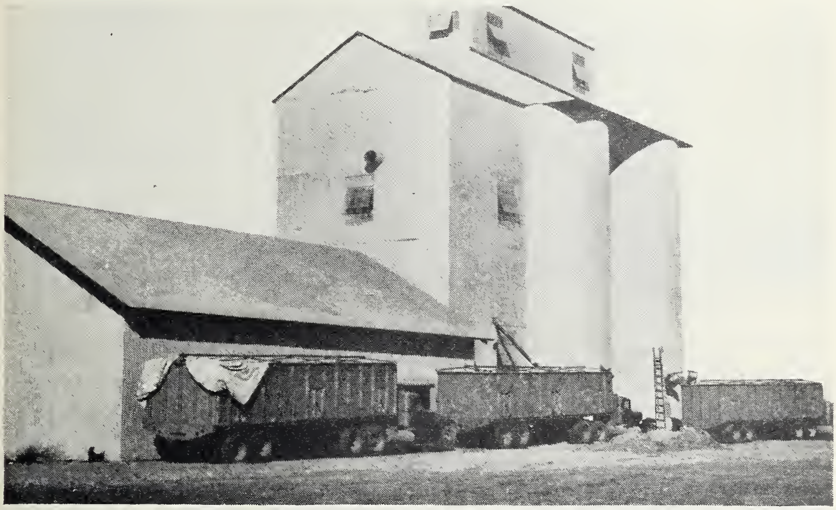
FIGURE 13.—Some farmers deliver their rice to market by horse and wagon.

Modern trucks will carry 100 to 250 bags at one time and with a trailer, such as is quite commonly used in California, nearly a carload (40 tons) may be hauled on each trip to the warehouse or mill. A new type of truck (fig. 14), built very much like a railroad car, is now used in hauling bulk rice. This truck has a roof or supports to which a canvas may be attached to protect the rice from the weather. It also has doors on the side and sliding gates in the bottom, which may be opened to allow the loose rice to run into the unloading dump at the drier, mill, or warehouse. These trucks have a capacity of 20 to 22 tons of rough rice and can be loaded and unloaded quickly, where proper loading and unloading machinery is available.

Growers who are located too far from a rice mill or storage warehouse to haul their grain directly to these plants frequently ship their rice by rail to the mill or market center. In such cases the rice is loaded into the railroad cars either in bags or in bulk. For bulk loading a portable elevator may be used or the rice may be shoveled by hand directly from the wagon or truck bed into the car. The portable elevators are generally placed at the rear of the truck or wagon and the rice is shoveled into a hopper from which it is conveyed by a belt into the car. Inside the car it is shoveled back to the ends until the car is completely filled. Some portable loaders have an attachment which will raise the front end of the wagon or truck and allow the rice to run out by gravity into the hopper of the loader. The capacity of a railroad car ranges from 30 to 50 tons, with 40 tons probably most usual.



PMA 14852

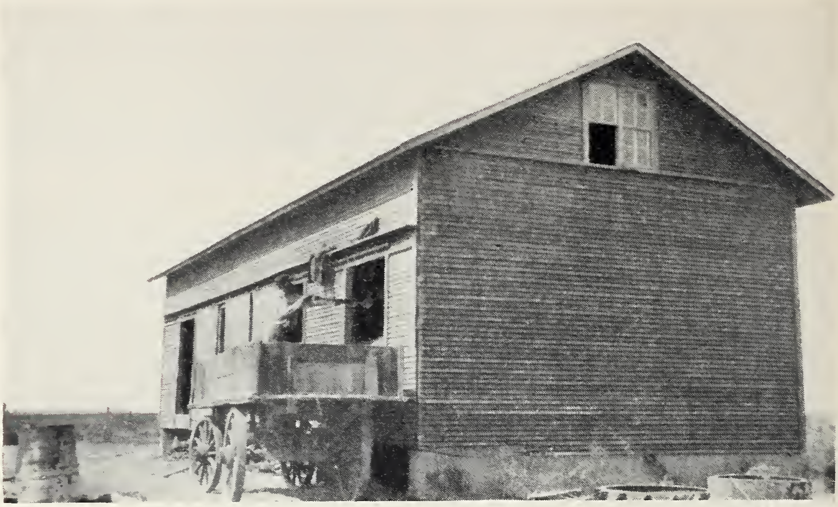
FIGURE 14.—Modern trucks will haul about a carload of rice each.

Rice Warehouses

Threshed rice, if dry enough to be stored, is usually hauled directly from thresher to barns, warehouses, or rice mills. Some farmers have warehouses on their farms and store their rice either in bags or in bulk. Others have bins in their barns in which to store bulk rice until they wish to sell it (fig. 15).

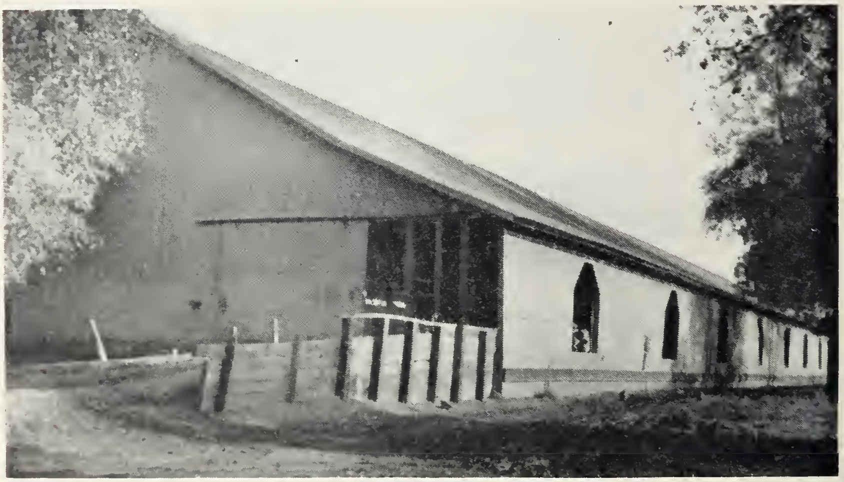
In most of the rice-producing sections a large part of the threshed rice is stored in public or private warehouses off the farm. The warehouses are located at country railroad sidings, in small towns, or at other convenient delivery points (fig. 16). Some are attached to rice mills or rice-drying plants.

Throughout the southern rice belt and in California some rough rice is still stored (1946) in warehouses in bags. At the smaller storage warehouses the wagons or trucks usually drive alongside an unloading platform. The bags are lifted from the trucks or wagons to the platform where laborers load 1 to 5 bags onto hand trucks and wheel them into the warehouse where other crews stack them into neat piles (fig. 17). Each grower's lot of rice is usually piled or stacked separately and appropriately marked. Large warehouses frequently have driveways through them to make unloading more convenient. Such warehouses are usually equipped with machinery for piling or stacking the bags.



PMA 11775

FIGURE 15.—Rice storage on the farm.

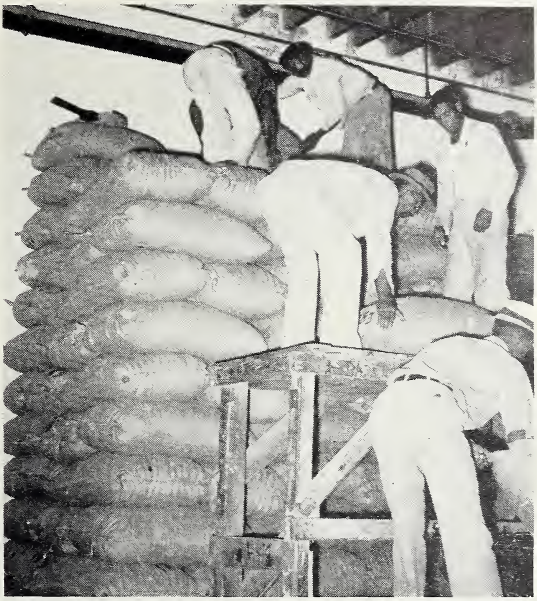


PMA 11781

FIGURE 16.—Country warehouse in which rough rice is stored in bags.

One type of machinery for stacking bags consists of power-driven belts or chains that move in a shallow trough. Cross cleats are attached to the belts or chains which hold the bags in place and cause them to move with the belt along the trough from the lower or loading end to the higher end which is adjusted to the height of the pile as it is built up. The men who are building the piles take the bags as they reach the top of the conveyor and place them in their proper places on the pile (fig. 18). In this manner the bags of rice are frequently stacked to a height of 15 feet or more. Another type of machinery works up and down in a frame on the order of an elevator.

In warehousing rice in bags, the bags must be carefully piled so that they will remain in place and not fall over. Should stacks fall, some bags are likely to burst and cause loss or damage to the rice. Care also should be taken in handling the bags to prevent tearing. Rats and mice cause loss or damage to sacked rice and in properly operated warehouses precautions are taken to keep rodents out of the warehouses.



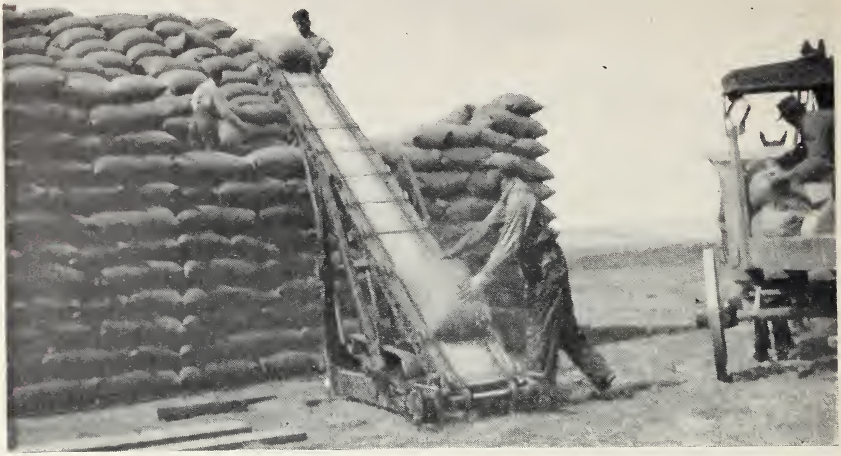
OWI 31441

FIGURE 17.—Interior of rice warehouse, showing how bags are piled or stacked.

Modern warehouses or elevators for bulk storage have increased in number and in capacity in recent years (fig. 19). These warehouses are constructed of wood, metal, tile, or concrete. Warehouses for bulk storage require machinery to elevate the rice into the bins and carry the rice from the bins direct to milling plants or to railroad cars or trucks for shipment. The elevating machinery carries the rice from the unloading dump to a point well above the top of the storage bins. From this point the rough rice flows through spouts to the various bins. Frequently rice is passed over a cleaner to remove trash and dirt before it is placed in storage.

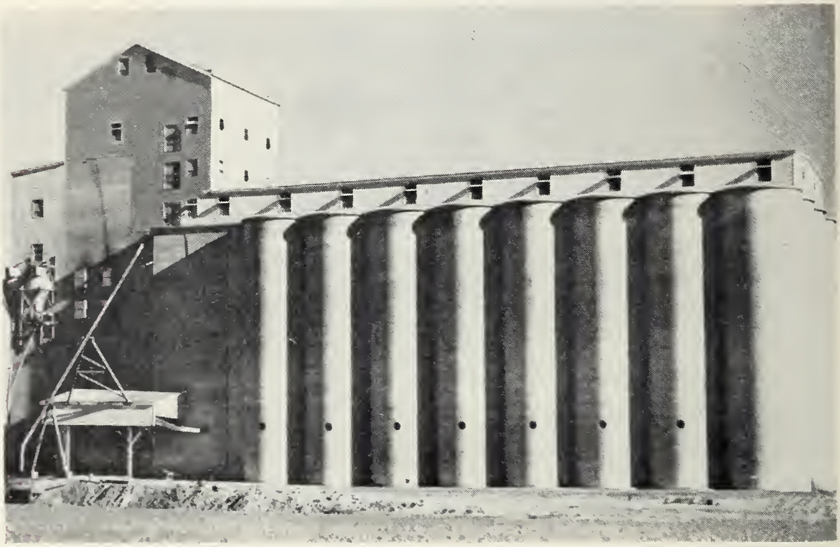
The rice is drawn from the storage bins through an opening in the bottom. The side walls at the bottom of the bin usually slope to this opening. A slide or gate across the opening controls the flow of grain from the bin to a conveyor belt or elevator which carries the rice to the car or truck loading machinery or possibly directly to a rice mill.

In many storage warehouses the rice is passed through an automatic scale and weighed as it is drawn from storage. This same scale may be used also to weigh the rice as it is placed in storage. Rough rice which is delivered to the warehouse by trucks or wagons directly from the fields or farm storage is usually weighed over platform scales which are large enough to weigh a full truckload at one time.



PMA 11587

FIGURE 18.—Machines are used to elevate the bags of rice to the top of the pile where workmen place them in order.



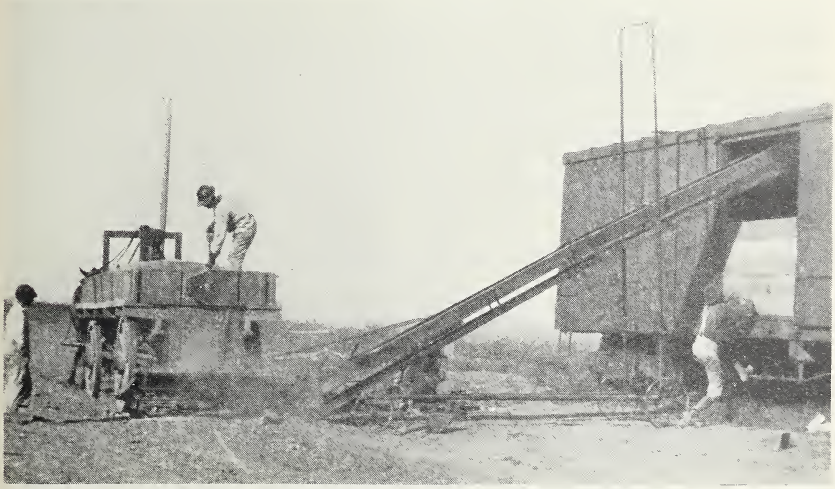
PMA 14851

FIGURE 19.—A modern elevator for bulk storage of rough rice.

Many modern warehouses or elevators have mechanical devices for unloading the grain from trucks or wagons. These devices are usually power-driven. One type of unloader consists of large wooden scoops attached to cables. These scoops are pressed into the lot of rice after a side or an endgate of the truck or wagon has been opened. The cables, which are operated by power, work through pulleys and pull the scoopful of rice out of the truck into the dump or elevator hopper. Since a part of the load usually flows out by gravity, sometimes only a few scoopfuls are required to unload a large truck.

Another type of unloader raises the front end of the truck by a cable until the rice flows, by gravity, out of the rear end. Still another device consists of a platform large enough to hold a truck. This platform, which is mechanically controlled, works on a pivot at the middle so that as the front end is raised the rear end is lowered. After all of the rice has left the truck the platform is returned to its original position so that the empty truck may be driven away and a loaded truck driven on.

A portable conveyor type of unloader is frequently used by rice growers to load rough rice directly into railroad cars for shipment to mills or warehouses (fig. 20). This type consists of a hopper into which the rice is shoveled or dumped from the wagon or truck and a conveyor which carries the rice from the hopper into the car. The power for this equipment is usually furnished by a gasoline engine.



PMA 11821

FIGURE 20.—Device for unloading bulk rice from trucks or wagons.

Bulk storage of rice has some advantages over storage in bags but there are problems in bulk storage which require special attention. Rice with excess moisture will heat and spoil quicker when large quantities are stored in bulk than when stored in bags, because the space between the bags will allow some movement of air around them. However, rice stored in bags will eventually spoil if it has a high moisture content. Bulk rice can be reconditioned more readily than bagged rice, since it can be moved from one bin to another and through a cleaner for cooling with the mechanical equipment of the warehouse. It can also be more readily passed through a drier. When warehouses become infested with weevils, or other injurious insects, bins may be more effectively fumigated than the open warehouse used for storing bagged rice.

Rice Driers

Rain or damp foggy weather at harvest prevents rice from becoming dry enough to store safely. For safe storage, bulk rice should contain not more than 14 percent of moisture. Ordinarily, when rice is harvested, the kernels contain from 20 to 30 percent of moisture.

Threshed rice that contains excessive moisture must be dried in order to reduce the moisture content to a safe percentage before the rice is stored either in bags or in bulk. One type of drier commonly called a "pot hole" drier can be made at the farm. Although this type is not so efficient as the commercially built driers it may be used in an emergency. The pot-hole drier consists of a long tunnel about 2 feet high and 3 feet wide made of lumber and closed at one end. On the top, placed close together, are rectangular openings just a little smaller than the size of a sack of rice. The sacks of rice to be dried are placed one on each opening. Air, usually heated by a gas flame, is forced into the tunnel from the open end by a large fan. This hot air passes out through the bags or sacks of rice. When that portion of the rice on the under side of the sack is dry the bags are turned over and the other side is dried. It is usually necessary to turn the bags several times to reduce the moisture near the center of the bag low enough for the rice to be stored or marketed satisfactorily.

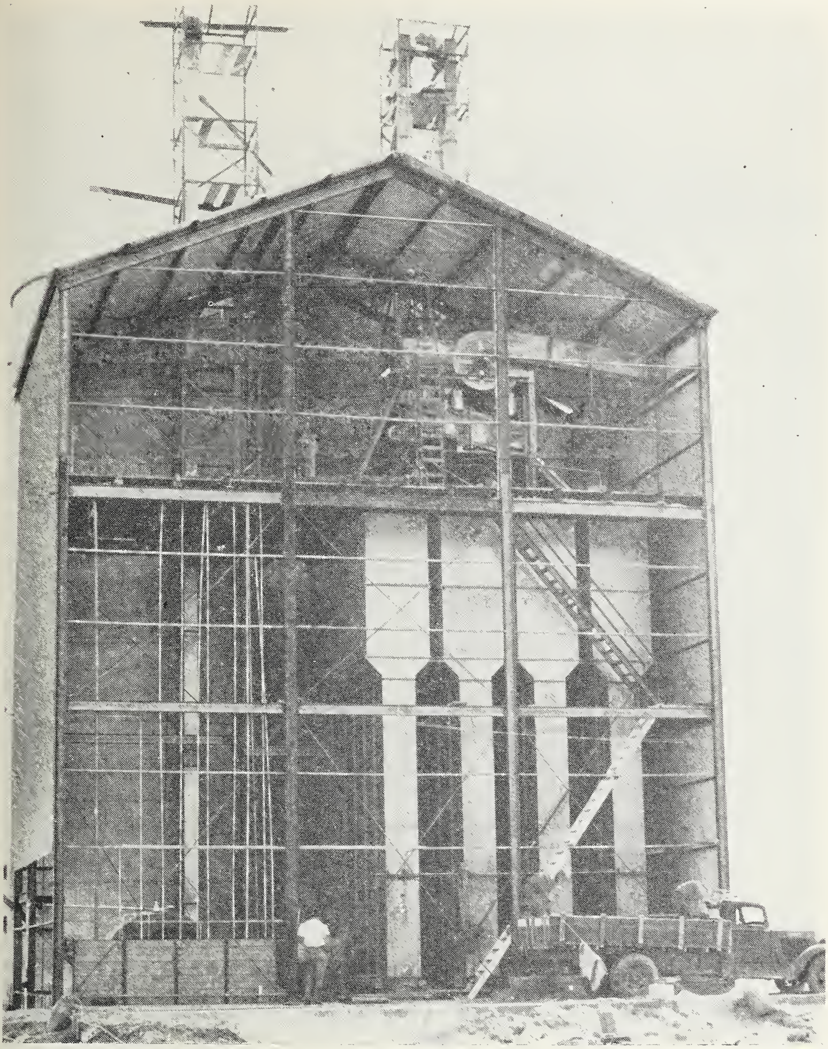
Commercial rice driers which are of the same general type as those used for drying other kinds of grain operate also on the principle of forcing warm, dry air through the damp or wet rice (fig. 21). A rice drying plant usually includes, in addition to the drying unit, a bin to receive the rice from the wagon, truck, or car, and elevators to carry the rice to the cleaning machinery, the drying units, and the storage bins. A large fan to force warm air through the drying unit and a furnace to heat the air are also necessary.

The receiving bin, also sometimes called a hopper or dump-pit, is located under the driveway or at some equally convenient place so that the rice may be unloaded directly into it from the farmers' wagons or trucks or possibly from cars. This bin has sloping sides so that the rice feeds downward into a conveyor or elevator which carries it to the cleaning machinery. This machinery is usually located on an upper floor of the plant and is so arranged that the cleaned rice may pass directly from it to the drier. It consists of vibrating screens that separate straw, sticks, and other coarse material from the grain, and a fan that draws or blows out the dust and chaff.

The most important part of the drying plant is the drying unit. This consists of upright rectangular hollow structures through which the rice to be dried flows from small bins or hoppers at the top in a stream or column to a conveyor at the bottom. This conveyor carries the dried grain to storage bins, tanks, or elevators. The sides of the drying units are usually covered with perforated metal or heavy screen to permit the warm drying air to pass through the column of rice. The warm, dry air enters the central air chamber from the bottom of the unit and is driven upward, by a large fan, through the interior of the unit and out through the vents into the column of rice on either side. The rate at which the rice flows through the drier is adjusted so that the rice reaches the desired degree of dryness as it passes through the stands. In batch driers the rice remains stationary and after a lot is properly dried it is drawn out and replaced with another batch of damp rice.

The air used in drying the rice is heated by a furnace or an oil or gas burner. The air is kept at a temperature that will not injure the rice but will absorb or drive out the greatest amount of moisture.

Elevators which consist of endless belts with cups or buckets attached and which move in enclosed wooden or metal upright hollow frames carry the rice from the unloading or receiving bins to the cleaning machine and driers. They also carry the rice from the driers back to the farmer's truck or wagon or to storage tanks or bins.

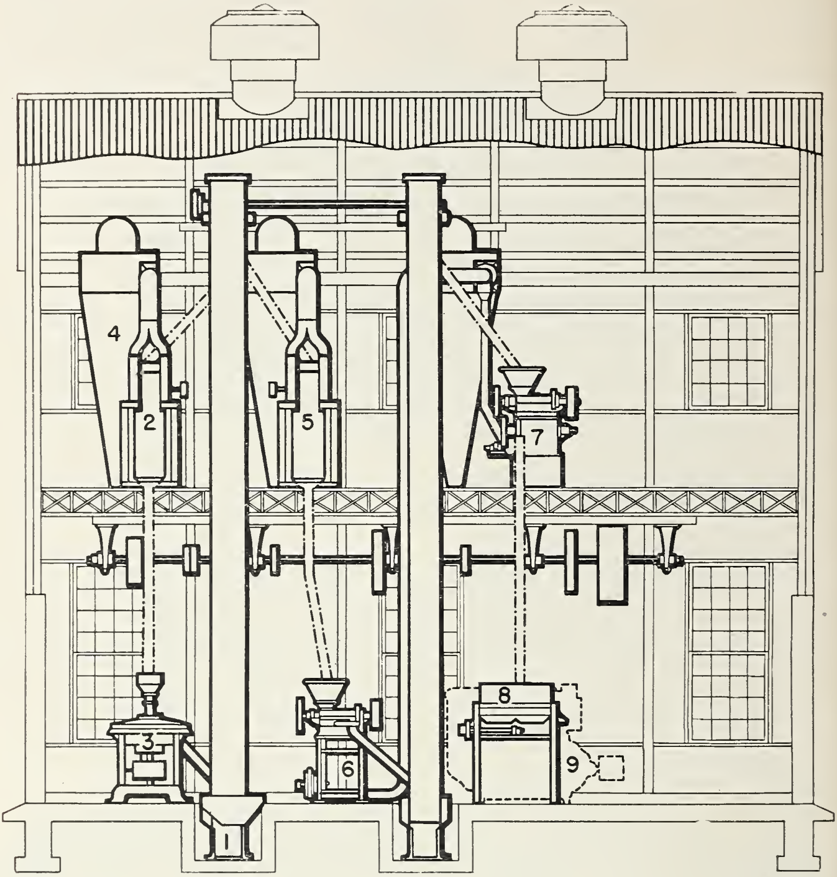


PMA 14849

FIGURE 21.—A modern rice drier. A truck unloading rice is in the foreground. In the building, the front wall of which has not yet been completed, may be seen four drying units and elevators to convey the rice to and from them. Above the drying units is the cleaning machinery. The fan that forces the warm air into the driers is at the lower left.

How Rice Is Milled

The milling of rice differs fundamentally from the milling of wheat. In milling wheat the chief product is flour, which must be ground very fine. In milling rice an effort is made to keep whole as many of the grains as possible. An efficient rice mill is one that properly cleans, scours, and polishes the rice grains with a minimum amount of breakage. Figure 22 shows an arrangement of milling machinery in a modern rice mill.



PMA 14853

FIGURE 22.—Arrangement of milling machinery in a modern mill: 1, elevator to carry rice to cleaners and mill; 2, cleaner; 3, sheller; 4, dust collector; 5, separator; 6, huller; 7, huller and polisher; 8, grader; 9, power unit.

Rough rice as it comes from the combine or threshing machine usually contains some chaff, weed seeds, possibly mud lumps, and other foreign material. These must be removed before the rice is milled. The first process in preparation for milling, therefore, is cleaning the rough rice to remove the foreign material.

The first milling operation after the rough rice is cleaned consists of removing the hulls from the kernels. This is done with hulling stones, commonly called shelling stones (fig. 23). The hulling stones, which are placed horizontally one above the other, are adjusted at a sufficient distance apart so that the longest grains of rice are not broken as they pass between the revolving stones. The rice is fed onto the stones from the center and as the grains pass between them the revolving motion of the stones whips the grains on end so that the tips of the hull are cracked and removed without breaking many kernels. The shorter grains which may pass through the first set of stones without being shelled are separated from the brown (hulled) rice and returned to another set of stones which are adjusted more closely until all the rough rice grains have been shelled. The hulls comprise nearly a fifth of the total weight of the rough rice.

From the hulling stones the mixture of brown rice, rough rice, and hulls is elevated to an upper floor of the mill where it passes through a fanning machine which separates the hulls from the rice. Hulls are generally used as fuel for the power plant of the rice mill or they may be ground for commercial use. They have little or no feed value. Sometimes they are used for scouring purposes.

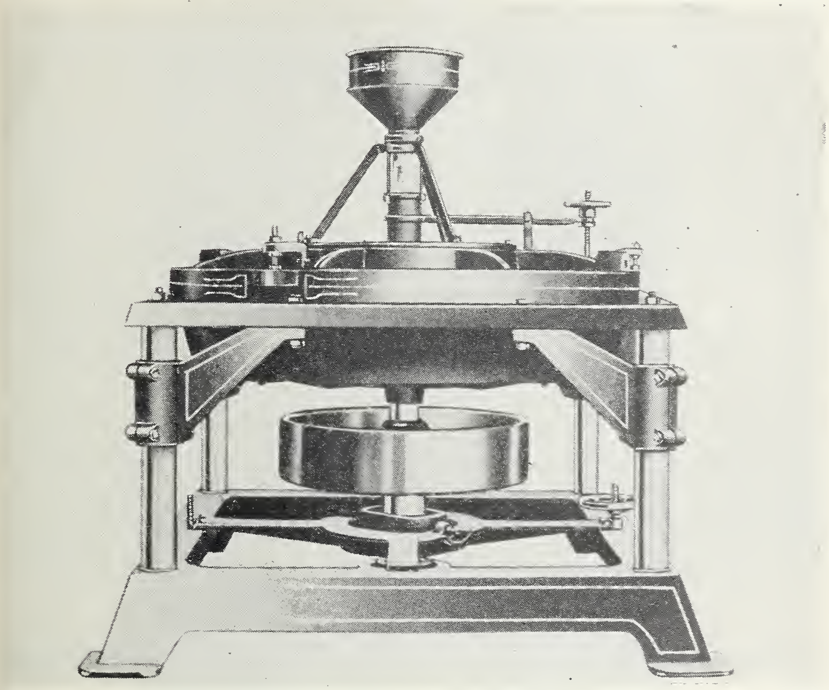


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FIGURE 23.—The rice sheller removes the hulls from the rough rice.

The brown rice, which also includes some unhulled rough rice, passes from a fanning machine to a paddy machine. The paddy machine is a device designed to separate the remaining rough rice from the brown rice. It consists of a large mechanically operated shaker or tray which is slightly elevated at one end. Small triangular metallic plates are attached to the shaker at regular intervals and these agitate the rice as the shaking proceeds and aid gravity in making the separation. The rough rice grains gradually move upward from the central feed and pass over the high side of the machine into a trough while the smoother brown kernels slide downward and are collected under the lower side. The rough or paddy rice is returned to the hulling stones and again passed through the shelling process.

The next machine in the milling process is called a "huller" (fig. 24). This name is rather misleading, however, because it is not used for removing the rough hull but for removing the bran layers from the brown rice which already has been shelled by the stones and separated from the hulls by the fanning and paddy machines. The huller looks like a small grain grinder and consists of perforated-iron walls and a rapidly revolving iron or steel tapered core with a ribbed surface. The brown rice from the paddy machine is fed into the hopper of the huller and passes down between the tapered cylinder and the rapidly revolving core. In this operation the outside brown bran coat is rubbed or milled off of the kernel which now begins to look like the rice usually seen in the stores.

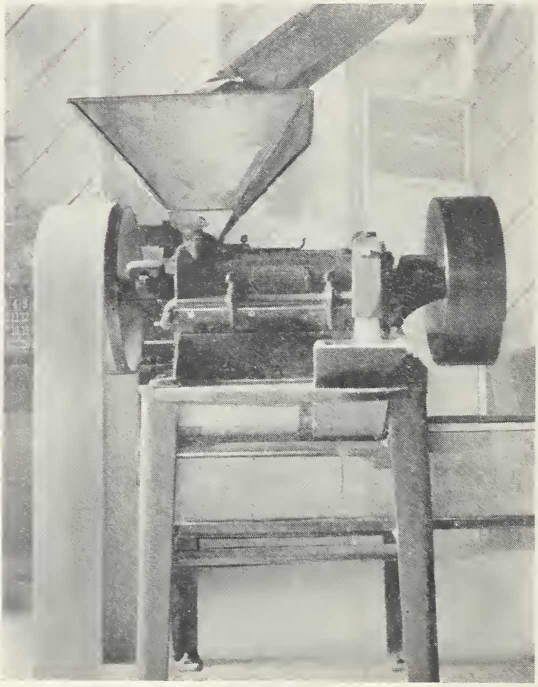

PMA 11845

FIGURE 24.—The bran layer is removed from the brown rice with a huller.

From the hullers the rice and any remaining bran passes to a machine known as an aspirator and bran duster. This machine is equipped with enclosed chambers through which the rice is passed and the bran removed by means of screens and a current of air or aspirator. The partially milled rice passes out at the end of the machine and is carried to the pearling cone.

The principal working part of the pearling machine is a cone covered with a composition stone. This is surrounded by a sieve composed of close-meshed heavy iron wire through which passes much of the material that is removed. The rice is fed into this machine from above and passes between the stone and the sieve and is thoroughly rubbed or scoured before it goes out at the bottom. The milled rice is again sent through the bran duster to remove the remaining bran. Some mills do not use the pearling cone but pass the rice through two sets of hullers.

The last scouring of rice in the milling process is done with a machine commonly called the brush. The brush consists of a vertical cylinder covered with overlapping pieces of pigskin or cowhide. It is revolved at high speed within a cylinder of wire screening. The rice is given a highly polished surface by this operation.

From the brush the rice, containing whole kernels and broken kernels, is passed into a brewers' reel for the first step in grading or sizing. This reel is enclosed and is covered with mesh wire screens. The small broken pieces of rice pass through the screen and are conveyed into sacks or bins for sale as brewers' rice. The whole kernels and large broken particles pass from the brewers' reel to grading or sizing reels which separate the whole kernels from the broken kernels.

Some millers coat the milled rice with glucose and talc to give it a higher polish. The coating is usually done in a cylinder, about 9 feet long and 4 feet in diameter, set on an incline and revolved by a gear on the outside. The rice, together with the coating materials, is put in at the higher end of the cylinder, which moves slowly round and round and ultimately discharges the polished rice at the lower end. Several small strips of wood are attached to the inside of the cylinder and these carry the rice up the side and let it fall again as the cylinder revolves, thereby thoroughly coating the rice with the glucose and talc. This operation gives the rice a glossy appearance.

There are three important rice-milling areas in the United States. One is in east-central Arkansas, another in southern Louisiana and southeastern Texas, and a third is in central California. The principal milling centers in these areas are DeWitt, Stuttgart, Carlisle, Jonesboro, Harrisburg, and Newport, in Arkansas; Baton Rouge, New Orleans, Abbeville, Gueydan, Eunice, Kaplan, Crowley, Lake Charles, and Mermentau, in Louisiana; Beaumont, El Campo, Houston, Bay City, and Orange, in Texas; and San Francisco, Stockton, Woodland, and Sacramento, in California. A few mills are located outside these States. Among them is one at Memphis, Tenn., and one at St. Louis, Mo.

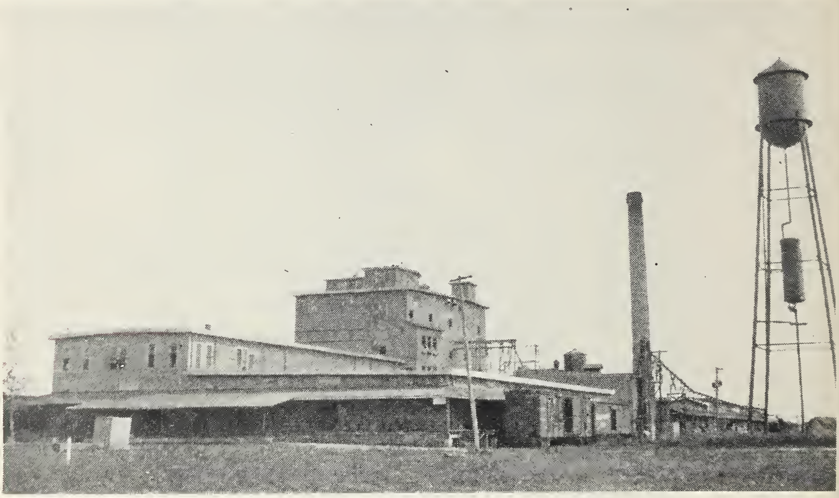
Marketing Rough Rice

Rough rice is marketed in much the same way as other grains, although there are some notable differences. Aside from the rice needed for seed and for farm use as food and feed, most of the rough rice produced in the United States goes to rice mills. These mills (fig. 25) are nearly all located in or near the rice-producing areas. With the mills so near at hand growers sell a large part of their crop directly to the millers or to buyers who represent the millers. Relatively small quantities are sold for feed and to dealers who export rough rice or who sell it to millers located outside the main rice areas. There are no rough-rice markets or exchanges, such as for wheat and corn, to which growers may ship their rice to be sold by brokers or commission merchants. But there are numerous elevators and warehouses in which growers may store rice until they wish to sell it or deliver it to the miller. These warehouses may be owned by individual rice growers, farmers, cooperative associations, rice millers, or by companies that supply water for irrigation.

The time at which the grower sells his rice depends on the state of the market, the farmer's need for funds, weather conditions, and other factors. Normally a large number of growers sell their rice at or soon after harvest. Some store it in warehouses after threshing and do not sell it until later in the season.

Southern rice farmers begin marketing their crop in August. Marketings increase in September and usually reach a peak in October or November. In California the harvest is later and marketings usually begin in October and reach a peak in January or February. For the country as a whole during the 10-year period 1934–43, rice growers sold about 80 percent of their crop before the first of March. They sold nearly 70 percent during the 5 months, October through February. For the 10-year period the percentage of the crop they sold each month averaged as follows:

August 3.8 percent, September 10.6, October 20.5, November 16.8, December 10.1, January 10.1, February 8.5, March 6.5, April 4.1, May 4.0, June 3.1, and July 1.9.



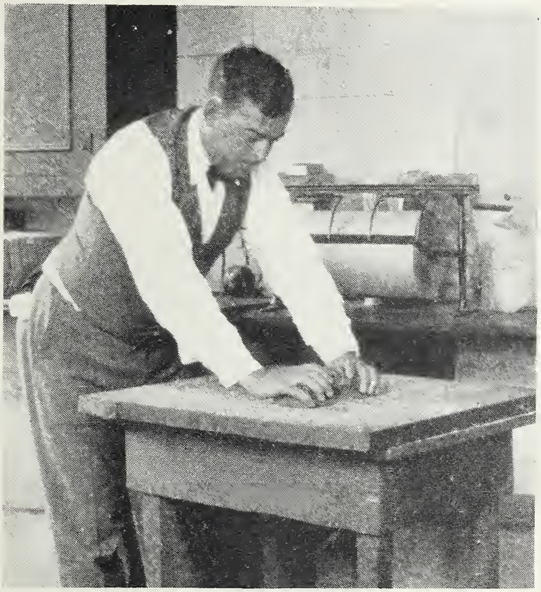
PMA 11840

FIGURE 25.—A modern rice mill.

When a grower wishes to sell his rice the most common practice is to take a sample to the miller or other buyer and obtain an offer for it. The miller usually tests the sample for milling quality by rubbing off the hulls, blowing out the chaff, and determining how easily the rice kernels break (fig. 26). He also notes whether the kernels have been damaged by heat, insects, disease, or other cause which would prevent the production of milled rice of good quality. After the buyer has determined the quality of milled rice that can be produced from the rough rice and made allowance for milling costs, he calculates the value of the rough rice from the price that he can obtain for the milled rice and makes an offer on that basis.

Another method of selling rice consists of "table sales" of warehouse lots of rice. This method is most commonly used by rice growers' associations, members of which have had their rice evaluated and placed in storage for subsequent sale. In "table sales" samples of rice from the various lots to be offered are placed on tables at the warehouse. Millers or others who wish to buy this rice examine the samples and place in the hands of the warehouse manager or other official who may be conducting the sale a sealed bid for each lot. After all the bids have been received they are opened and the buyer making the highest bid, when all conditions are considered, is awarded the lot of rice, usually subject, however, to confirmation by the owner of the rice.

Rice also is marketed through pools. This method is used principally by members of cooperative associations. Under this plan the grower delivers the rice to the association warehouse or mill and receives an advance payment of 50 percent or more of its market value. The rice is stored in the warehouse or mill with other lots of the same variety or quality. It is sold by the sales manager of the association at times and on conditions which he believes are most favorable to the owners. After all the rice has been sold and selling costs have been deducted, the money is divided proportionally among those who placed their rice in the pool. If the association operates a rice mill the pooled rice may be processed and sold as milled rice. The grower then receives his part of any increase in the market returns as a result of milling the rice. Final payments for pooled rice are usually not made until the close of the marketing or milling season.



PMA 11866

FIGURE 26.—The miller tests the quality of the rough rice before buying.

Another method sometimes used in selling rough rice is called toll milling. Under this plan the grower arranges with a rice miller, for a specified toll charge, to mill his rice and sell it and the byproducts. The money received for the products, less the toll charge, is paid to the rice grower. Toll milling is not common except in seasons when the market situation is uncertain or when rice millers are hesitant in making outright purchases of rough rice.

Marketing Milled Rice

Milled rice is a manufactured product and is marketed in much the same way as flour, corn grits, breakfast cereals, and other grain food products. The most common method of marketing is that by which the rice miller sells his product in carlots to jobbers, large wholesalers, or chain-store operators. The jobbers and wholesalers in turn sell the rice usually in smaller lots to grocers or other retail dealers.

Some of the larger rice millers maintain sales agencies and storage warehouses in the principal markets and sell direct to the grocery and retail trade from these warehouses. In some parts of the country jobbers and wholesalers place their orders with the mills through a broker who may represent one or more millers. Many buyers prefer to purchase their rice through brokers since this plan has the advantage of having the miller's local representative nearby so that if any difficulties arise concerning the transaction, adjustments may be made with the broker rather than with the distant miller whom the buyer may not know.

Until recent years milled rice was usually shipped in cotton bags that held 100 pounds each and were called pockets (fig. 27). If the bags were to be handled several times before final delivery or were to be loaded onto boats they generally were placed inside heavier burlap bags to prevent loss through tearing of the container.

Within the past few years a number of millers and rice distributors have installed machinery to package rice (fig. 28). These packages include 5- or 10-pound bags or cardboard boxes holding 1, 2, 3, or 5 pounds. Some packages contain only 12 ounces. Before the war, cellophane bags holding

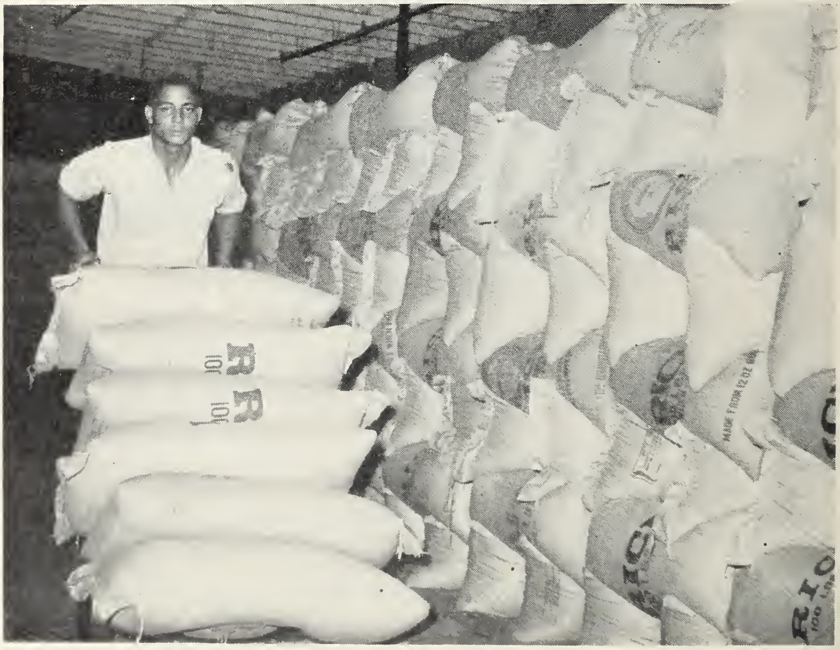


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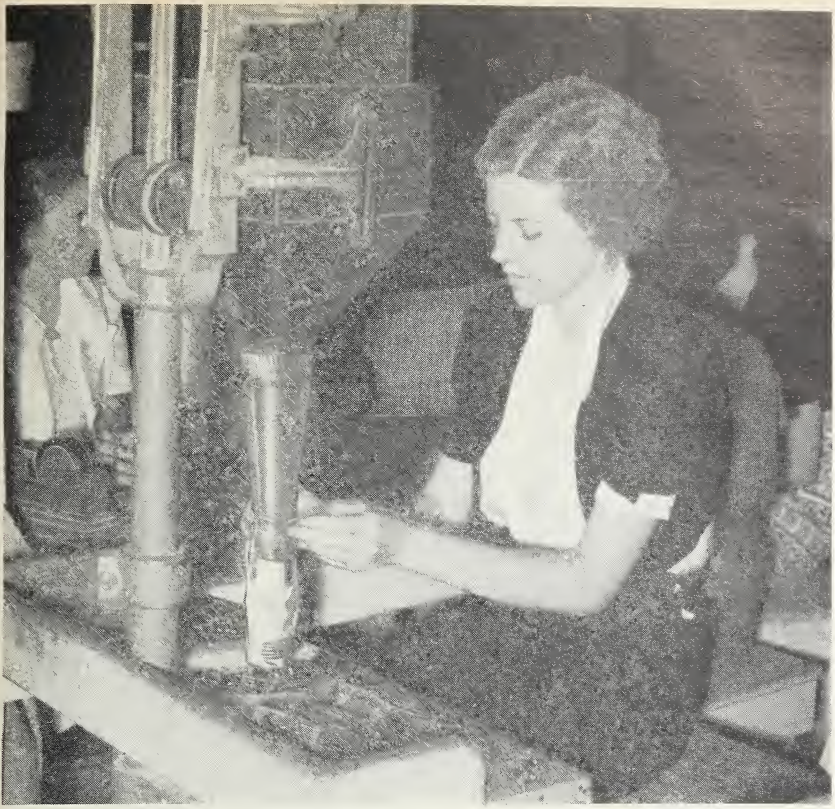
FIGURE 27.—Bags or pockets of milled rice.



FSA 31445

FIGURE 28.—Packaging rice at a mill.

1 to 2 pounds were quite commonly used. When prepared for shipment the smaller bags are usually placed in a larger bag for security and easier handling. The 1-pound boxes are usually packed in cartons that hold 24 to 30 pounds, and the 2-, 3- or 5-pound boxes in cartons that hold from 48 to 60 pounds.

When rice is milled the various classes or varieties are usually kept separate since some have much higher market value than others. The short- and medium-grain varieties usually sell for less in the markets than the long-grain varieties. This is partly because of the relatively larger supply of the short- and medium-grain rices but cooking quality and consumer preference also are factors.

Where Milled Rice Goes

Prior to World War II a little more than half of the milled rice produced in the United States was used here. About half of the remainder was shipped to Puerto Rico, Virgin Islands, Hawaii, and Alaska. Exports accounted for the remainder. Stimulated by higher prices and an urgent demand, farmers increased their rice acreage during the war period. Production of milled rice increased accordingly. Domestic consumption increased from an average of about 7 million bags (100-pound) during the period 1934–39 to slightly more than 8 million bags in 1944. Shipments to our Territories also increased slightly, but greater quantities than usual went to the armed forces, largely for overseas use. Much more rice was also exported to Cuba and to the countries to which the United States furnished lend-lease supplies.

Rice consumption in the United States is not large compared with that of many other countries, and for the country as a whole its use for food averages less than 6 pounds per person per year. In some sections, however, rice is an important food. Some families in the rice-growing sections of Louisiana consume around 100 pounds per person per year. In the southeastern United States annual consumption ranges from 25 to 50 pounds per person. In the more northern States, where people eat very little rice, consumption averages only 1 or 2 pounds for each person per year.

United States Standards

To aid growers and members of the rice industry to market rough rice to the best advantage, the U. S. Department of Agriculture established standards of quality and condition for rough rice.

United States standards divide rough rice into classes and grades. The rough-rice classes, numbering 11, represent the principal commercial varieties. They are as follows:

Class I—Edith
Class II—Fortuna
Class III—Lady Wright
Class IV—Rexoro
Class V—Nira
Class VI—Blue Rose
Class VII—Early Prolific
Class VIII—American Pearl
Class IX—Calady
Class X—Miscellaneous classes
Class XI—Mixed Rough Rice

The numerical grades for rough rice are Nos. 1 to 6 inclusive with Sample grade added to include rice that does not meet the requirements of the numerical grades. Factors that are important in determining the grades are the percentages of damaged kernels, red rice, cereal grains, and rice of other classes. Special grades have been established for damp, seedy, muddy, chalky, weevily, and musty rough rice.

United States standards also have been established for all classes of milled rice and for brown rice (rice from which the hull, but not the bran and germ, have been removed). Today milled rice and brown rice are largely sold to the wholesale trade on the basis of these standards.

There are nine classes of milled and brown rice. These are the same as classes I to IX, inclusive, for rough rice. For each class of milled rice there are seven United States official grades, namely: U. S. No. 1, U. S. No. 2, U. S. No. 3, U. S. No. 4, U. S. No. 5, U. S. No. 6, and U. S. Sample grade. There are four United States official grades for each class of brown rice. These are designated as U. S. Fancy, U. S. No. 1, U. S. No. 2, and U. S. Sample grade for California brown rice, and as U. S. Extra Fancy, U. S. Fancy, U. S. Choice, and U. S. Sample grade for southern brown rice.

Rice Inspection Service

The U. S. Department of Agriculture maintains an inspection service for both rough and milled rice. Federal or Federal-State rice-inspection offices are located in the principal rice-producing areas (fig. 29).[5] Here, rice growers, millers, and others interested may have samples of their rough rice analyzed by licensed inspectors to determine its class and grade, which are important factors in establishing its market value. They also may have their rice tested for milling quality and receive a certificate which will show, for the lot tested, the percentage of whole milled rice (with not to exceed 4 percent broken kernels), the percentage of other broken kernels, and the percentage of moisture. Millers and other buyers of rough rice may use the service, for which a small fee is charged.

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[5] Information as to location of Federal or Federal-State rice-inspection offices may be obtained by writing to the Grain Branch of the Production and Marketing Administration, U. S. Department of Agriculture, Washington 25, D. C.

Milled rice also may be inspected by licensed rice inspectors and certificates may be obtained to show the grade, class, quality, or condition and/or origin. An inspection certificate enables the buyer to know the quality of rice he is purchasing and greatly assists trading.

The first and most important step in inspecting a lot of rice is the obtaining of a representative sample. A considerable portion of the rough rice produced in the Unietd States is sacked at the time of harvest and is handled in sacks until the time it is milled. Rough rice in sacks is sampled with a rice trier or probe. A bulk trier, like triers for sampling other grains, is used for sampling rough rice in bulk. Samples of packaged rice are obtained by taking an occasional package at random from a lot.

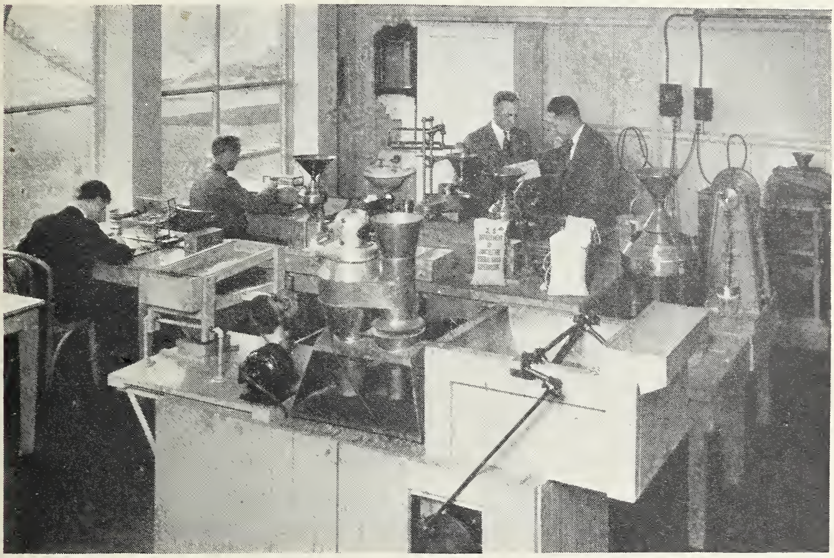

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FIGURE 29.—United States rice-inspection office.

The sampler compares the samples for uniformity as to quality and condition. If a large portion of the lot is distinctly inferior to the remainder of the lot a separate sample is drawn from each of the portions. Each portion is graded and certificated separately when there is a material difference in quality but when a lot is more or less uniform as to quality and condition, only one certificate is issued.

Such grading factors as weevil infestation and odor are determined when the sample is drawn. The other tests to determine grade are made after the sample is taken to the laboratory. Moisture content is an important factor because it affects the keeping quality of the rice.

In rough rice the factor that determines the value of the rice to the greatest extent is milling quality. "Milling quality" is a term used to denote the resistance to breakage of rice in milling or the quantity of whole-grain rice and broken rice that is obtained from a unit of rough rice. The most important factors other than moisture content in the grading of milled rice are the percentage of broken and damaged kernels, general appearance, and number of weed seeds present.

Market News Service

A market news service maintained by the U. S. Department of Agriculture is a further aid to growers in planning their production and marketing programs. The service is likewise useful to members of the rice-milling industry and to distributors and buyers of rice. Features of this service are a weekly rice market review, a monthly statistical report, and annual summaries.[6]

The weekly market review reports on crop conditions, harvest prospects, market movement, prices, and other factors that may affect the supply, demand, or price of rough or milled rice. The monthly statistical report shows quantities of rough rice received and milled by millers and the quantity of milled rice produced and distributed by them. The annual summaries carry long-time statistical tables for both the Southern States and California on the supply and distribution of rough and milled rice.

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[6] Copies of these market reports may be obtained upon request to the Grain Branch, Production and Marketing Administration, U. S. Department of Agriculture, Washington 25, D. C.

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